QUARTERLY JOURNAL

OF THE

Royal Meteorological Society

Editor
R. P. PEARCE

Vol. **111**, 1985

ROYAL METEOROLOGICAL SOCIETY
JAMES GLAISHER HOUSE, GRENVILLE PLACE,
BRACKNELL, BERKSHIRE RG12 1BX

CONTENTS OF VOLUME 111

PAGE

A. Hollingsworth, A. C. Lorenc, M. S. Tracton, K. Arpe, G. Cats, S. Uppala and P. Kallberg—The response of numerical weather prediction systems to FGGE level IIb data. Part I: Analyses 1

K. Arpe, A. Hollingsworth, M. S. Tracton, A. C. Lorenc, S. Uppala and P. Kallberg—The response of numerical weather prediction systems to FGGE level IIb data. Part II: Forecast verifications and implications for predictability . . 67

B. R. Barwell and A. C. Lorenc—A study of the impact of aircraft wind observations on a large-scale analysis and numerical weather prediction system 103

P. Hignett, A. A. White, R. D. Carter, W. D. N. Jackson and R. M. Small—A comparison of laboratory measurements and numerical simulations of baroclinic wave flows in a rotating cylindrical annulus 131

Dayton G. Vincent—Cyclone development in the South Pacific convergence zone during FGGE, 10–17 January 1979 155

M. J. Manton—Some effects of convection on geostrophic flow 173

S. C. Mossop—Microphysical properties of supercooled cumulus clouds in which an ice particle multiplication process operated 183

Klaus P. Hoinka—Observation of the airflow over the Alps during a foehn event . 199

Norman A. Crook and Martin J. Miller—A numerical and analytical study of atmospheric undular bores 225

Peter Lynch—Initialization using Laplace transforms 243

Reviews

Prophet—or Professor? The life and work of Lewis Fry Richardson. By O. M. Ashford (G. W. Platzman) 259

Prashant D. Sardeshmukh and Brian J. Hoskins—Vorticity balances in the tropics during the 1982–83 El Niño-Southern Oscillation event 261

John Austin and A. F. Tuck—The calculation of stratospheric air parcel trajectories using satellite data 279

Masato Shiotani and Isamu Hirota—Planetary wave–mean flow interaction in the stratosphere: a comparison between northern and southern hemispheres . 309

S. A. Clough, N. S. Grahame and A. O'Neill—Potential vorticity in the stratosphere derived using data from satellites 335

D. N. Al-Ajmi, R. S. Harwood and T. Miles—A sudden warming in the middle atmosphere of the southern hemisphere 359

S. Nicholls—Aircraft observations of the Ekman layer during the Joint Air-Sea Interaction Experiment 391

S. K. Mishra, M. D. Patwardhan and L. George—A primitive equation barotropic instability study of the monsoon onset vortex 427

K. A. Browning and F. F. Hill—Mesoscale analysis of a polar trough interacting with a polar front 445

P. H. Herzegh and P. V. Hobbs—Size spectra of ice particles in frontal clouds: correlations between spectrum shape and cloud conditions 463

B. F. Ryan, W. D. King and S. C. Mossop—The frontal transition zone and microphysical properties of associated clouds 479

Jean Jouzel, Liliane Merlivat and B. Federer—Isotopic study of hail: the δD-$\delta^{18}O$ relationship and the growth history of large hailstones . . . 495

T. A. Hill and T. W. Choularton—An airborne study of the microphysical structure of cumulus clouds 517

P. S. Brown and G. D. Robinson—Variance spectra of observed winds and initialized wind fields at the 500 mb level over Europe 545

J. J. Morcrette and J. F. Geleyn—On the influence of different radiation parametrizations on model-generated radiation fields 565

D. E. Parker—On the detection of temperature changes induced by increasing atmospheric carbon dioxide 587

TABLE OF CONTENTS

PAGE

T. D. KEENAN—Statistical forecasting of tropical cyclone movement in the Australian region 603

P. J. MASON and J. C. KING—Measurements and predictions of flow and turbulence over an isolated hill of moderate slope 617

W. E. BAKER and Y. BRIN—A comparison of observed and forecast energetics over North America 641

Reviews

Problems and prospects in long and medium range weather forecasting. Ed. D. M. Burridge and E. Källén (A. Gilchrist); *Mesoscale meteorology—theory, observations and models*. Ed. D. K. Lilly and T. Gal-Chen (K. A. Browning); *Weather and climate responses to solar variations*. Ed. B. M. McCormac (C. K. Folland); *Volcanoes of the World: A regional directory, gazetteer, and chronology of volcanism during the last* 10,000 *years*. By T. Simkin et al. and *Krakatau* 1883: *The volcanic eruption and its effects*. By T. Simkin and R. S. Fiske (D. H. McIntosh); *Ice sheets and climate*. By J. Oerlemans and C. J. van der Veen (I. N. James); *Remote sensing applications in marine science and technology*. Ed. A. P. Cracknell (I. S. Robinson); *Palaeoclimatic research and models: Report and proceedings of the workshop held in Brussels, December* 1982. Ed. A. Ghazi (H. H. Lamb); *Mesoscale meteorological modelling*. By R. A. Pielke (A. J. Thorpe); *Fundamentals of air pollution*. By A. C. Stern, R. W. Bonbel, D. B. Turner and D. L. Fox (R. S. Scorer); *Prophet – or Professor? The life and work of Lewis Fry Richardson*. By O. M. Ashford (G. W. Platzman) 665

Obituary notice 675

J. L. BROWNSCOMBE, J. NASH, C. F. ROGERS and G. VAUGHAN—Solar tides in the middle atmosphere. Part I. Description of satellite observations and comparison with theoretical calculations at equinox 677

J.-J. MORCRETTE and Y. FOUQUART—On systematic errors in parametrized calculations of longwave radiation transfer 691

W. A. HECKLEY—Systematic errors of the ECMWF operational forecasting model in tropical regions 709

N. A. BOND and R. G. FLEAGLE—Structure of a cold front over the ocean 739

D. MÜLLER, D. ETLING, CH. KOTTMEIER and R. ROTH—On the occurrence of cloud streets over northern Germany 761

A. M. BLYTH and J. LATHAM—An airborne study of vertical structure and microphysical variability within a small cumulus 773

J. C. R. HUNT, J. C. KAIMAL and J. E. GAYNOR—Some observations of turbulence structure in stable layers 793

H. J. EXTON, J. LATHAM, P. M. PARK, S. J. PERRY, M. H. SMITH and R. R. ALLAN—The production and dispersal of marine aerosol 817

W. J. SHUTTLEWORTH and J. S. WALLACE—Evaporation from sparse crops—an energy combination theory 839

M. W. MONCRIEFF—Steady convection in pressure coordinates 857

Notes and Correspondence

L. M. MCMILLIN and D. S. CROSBY—Some physical interpretations of statistically derived coefficients for split window corrections to satellite derived sea surface temperatures 867

Reviews

Remote assessment of ocean color for interpretation of satellite visible imagery: a review. By H. R. Gordon and A. Y. Morel (I. S. Robinson); *The glaciers of equatorial East Africa*. By S. Hastenrath (R. Murray); *Large-scale oceanographic experiments and satellites*. Ed. C. Gautier and M. Fieux (H. Charnock); *Milankovich and climate*. Ed. A. Berger, J. Imbrie, J. Hays, G. Kukla and B. Saltzman (B. J. Mason); *Aeronomy of the middle atmosphere*. By G. Brasseur and S. Solomon (L. Thomas); *Proceedings of the Ninth International Cloud Physics Conference*, Tallinn, 1984 (P. R. Jonas) 872

Obituary notice 876

B. J. HOSKINS, M. E. MCINTYRE and A. W. ROBERTSON—On the use and significance of isentropic potential vorticity maps 877

CONTENTS OF VOLUME 111

PAGE

T. N. PALMER and SUN ZHAOBO—A modelling and observational study of the relationship between sea surface temperature in the north-west Atlantic and the atmospheric general circulation 947

RICHARD SWINBANK—The global atmospheric angular momentum balance inferred from analyses made during the FGGE 977

J. A. PYLE and A. M. ZAVODY—The derivation of hydrogen-containing radical concentrations from satellite data sets 993

J. C. FARMAN, R. J. MURGATROYD, A. M. SILNICKAS and B. A. THRUSH—Ozone photochemistry in the antarctic stratosphere in summer 1013

J. D. HAIGH—A fast method for calculating scale-dependent photochemical acceleration in dynamical models of the stratosphere 1027

G. K. VALLIS—Remarks on the predictability properties of two- or three-dimensional flow 1039

GUO-XIONG WU and SHOU-JUN CHEN—The effect of mechanical forcing on the formation of a mesoscale vortex 1049

B. G. HUNT—A model study of some aspects of soil hydrology relevant to climatic modellling 1071

E. BOUWS, J. J. EPHRAUMS, J. A. EWING, P. E. FRANCIS, H. GUNTHER, P. A. E. M. JANSSEN, G. J. KOMEN, W. ROSENTHAL and W. J. P. de VOOGT—A shallow water intercomposition of three numerical wave prediction models (SWIM) 1087

S. C. MOSSOP—Secondary ice particle production during rime growth: the effect of drop size distribution and rimer velocity 1113

Notes and Correspondence

G. STANHILL—Observations of shade-ring corrections for diffuse sky radiation measurements at the Dead Sea 1125

W. W. MORIARTY—Comments on the paper 'More realistic distributions for extreme wind gusts' by K. J. A. Revfeim and J. W. D. Hessell (QJ April 1984, *110*, 505–514). Reply by K. J. A. Revfeim and J. W. D. Hessell 1131

J. NORBURY and M. J. P. CULLEN—A note on the properties of the primitive hydrostatic equations of motion 1135

Reviews

Greenhouse Effect and Sea Level Rise: A challenge for this generation. By M. C. Barth and J. G. Titus (J. S. A. Green); *Satellite Oceanography*. By I. S. Robinson (D. Offiler); *The Photochemistry of Atmospheres*. Edited by Joel S. Levine (F. W. Taylor) 1139

Obituary notices 1142

Index and Contents pages 1145